The Canadian Entomologist

LXIV ORILLIA, DECEMBER, 1932 No. 12

EVALUATION OF THE FOREST FLORA POPULATION

BY ARTHUR PAUL JACOT,

Ithaca, New York.

In all the quantitative studies of the forest floor, sod, and soil faunas, the Acarina or mites have been grouped under one head as useful in reducing dead leaves and twigs to crude mineral matter, in spite of the fact that it is well known that some of the floor Acarina are eaters of mildews and moulds (minute fungi), some are predaceous, and some feed on living plant tissue. Even among the Oribatoidea, which are predominantly saprophytic, one finds piercing mouth parts and an entire subfamily as well as odd genera in which the triturating mouth parts are highly modified toward piercing. Needless to say, in evaluating a fauna it is quite misleading to lump these very variable feeders as saprophytes, especially when they are the *chief* faunal element of the forest litter. For example:

Pfetten (1) found mites so abundant in fir woods by comparison with other forms of life that he merely recorded them as numerous. Dogiel and Efremoff (2) found that in fir woods Acarina comprised seventy-nine per cent of the fauna (p. 109). Soudek (3) working in spruce woods found the mites so numerous he counted them by an "approximate counting method." Using a half meter quadrat he found from 2,800 to 13,200 individuals. Bornebusch (4) found that in beech woods, though they only constitute two or three per cent of the total *weight* of the invertebrate fauna (including soil fauna) they equaled 16.1% of the *respiration;* in spruce the corresponding figures are 5.7 and 25.6%; while still higher figures are given for other habitats. In fact it is well known that as animals decrease in size they increase in numbers and activity, most of these forms being active throughout the winter when the temperature of their habitat rises above freezing.

Another source of error is the inclusion of moss in the samples. As is well known to Acarologists, moss forms a distinct biotic unit supporting a distinct microfauna as well as acting as a sponge for the absorption of neighboring elements during certain meteorological and edaphic conditions. To include this independent faunule is to incorporate, in the analysis of the litter reducing fauna, one which has only a casual relation to it. In a similar way Boizowa (5) in his study of the pine wood floor includes but does not separately evaluate the fauna of the floor covering lichen (Cladonia).

Finally the forest floor, being a general recipient of all that comes down, includes, especially after rains, a large number of arboreal individuals beaten down by rain storms. This should, in part account for the large numbers of individuals found after rains by others (2). A general tendency has been shown to include such extraneous elements. A second related factor is the increase in the upper layers, especially when moss is present, due to rise from lower layers after rain soaking. Willmann (6) has already shown that the dominant factor in control of distribution of Acarina in their respective layers (at least in bogs)

B. S. Z. LIBRARY

is moisture. Thus any change in moisture content of the layers brings about a migration of the Acarian (and Collembolan) fauna to another layer. This *may* not apply to species that live within pine and spruce needles or decaying wood.

Considering such studies from an entirely different viewpoint, one may well ask what is the object of securing mass statistics on the systematic groups? That is to say, why should it be of importance to know that eighty per cent of the forest litter fauna is Acarian while the insects make up only fifteen per cent (2)? Such knowledge is of no practical value. In fact it is merely another way of saying that forest litter is such a thin layer that only animal life of less than two millimeters can be dominant therein, and that soil interstices and porosity is such as to demand nonfossorial animals of less than one millimeter. If, therefore, the investigator could forget the system of classification and consider all species under such heads as saprophytes (dead wood eaters, dead leaf eaters, dung eaters, carcass eaters), fungivores, vegetarians, predators, and transients, a more useful grouping would result, and the first step taken towards a study of the possibility of increasing the rate of litter transformation (reduction). This, however, also involves recording and considering the place of the larvae and the three nymphal stages of the various species. For, according to my observations, these larvae and nymphs are far more numerous, though much more minute, than the adults. Furthermore their whole existence is made up of feeding, while much of the life of the adult is given over to the various reproductive activities. The minuteness of the immature stages is an indication of their greater penetrability. For instance, a family of immature moss mites can be comfortably occupied eating out a dead spruce leaf where the adult form will barely fit in it. Yet, as far as published data is concerned, these *most* important forms have been entirely overlooked.

The era of these former meaningless and mechanical quantitative studies should be closed, and a new one founded on sound ecological principles begun. This can only be carried out on the same scholastic basis and by the same type of investigators that have placed the study of soil chemistry and soil protozoology on the high level which they now hold.

Thus it becomes apparent that although the Acarian fauna is of the greatest importance in breaking down the dead leaves and twigs of the forest floor, quantitative work is certain to give very incorrect results unless each species is properly evaluated. Having analyzed the fauna and evaluated its various elements one should then be able to determine under what cultural conditions the litter destroyers become most numerous and are most free from natural checks. Such culture methods should aid in speeding up litter "decay" and thus hasten its availability as plant food.

REFERENCES.

1. Pfetten, Josef Freiherr, 1925, Beitrage zur Kenntnis der Fauna der Waldstreu; Fichtenstreu-Untersuchungen, Zeitschrift fur angewandte Entomologie, vol. 11, pp. 35-54.

2. Dogiel, V., and G. Efremoff, 1925, Versuch einer quantitativen Untersuchung der Bodenbevolkerung im Fichtenwalde, Travaux de la Societe des Naturalistes de Leningrad, vol. 55, pt. 2, pp. 97-110.

3. Soudek, Stepan, 1928, Fauna of Forest Soil, Bulletin de l'ecole superieure d'agronomie, Brno, R.C.S., Sign D8, 24 pp., 3 figs.

4. Bornebusch C. H., 1930, The Fauna of Forest Soil, Det Forstlige Forsogsvaesen I Danmark, vol. II, pt. I, 224 pp., 27 pls., 7 txt. figs.

5. Boizowa, M. K., 1931, Die Tierbevolkerung der unteren Schichten des Pinetum Cladinosum, Wiss. Mitt. Univ. Perm. abt. 4 Naturw., pt. 1, pp. 97-152, 1 pl., 6 figs.
6. Willman, Carl, 1928 (Oct.), Die Oribatidenfauna nordwestdeutscher und einiger suddeutscher Moore, Abh. Nat. Ver. Bremen, vol. 27, heft 1, pp. 143-176, 15 figs.

NOTES ON SOME DIURNAL LEPIDOPTERA FIGURED IN HOLLAND'S REVISED BUTTERFLY BOOK*

BY J. MCDUNNOUGH,
Ottawa, Ontario.

Oeneis semplei Holl. As far as can be judged by a study of a figure of the underside of the male type (Butt. Book, Pl. LXIII, fig. 3) this is the species referred to by Benjamin and myself as *melissa* Fabr. (Can. Ent. 1925, Vol. LVII, p. 58). In the series of four males and four females from the east coast of Labrador in the Canadian National Collection it is true that none show quite as definite a subapical ocellus as figured by Holland for the female of *semplei* but in two instances indications of this ocellus are clearly visible on the underside; in other respects the maculation appears to be identical. A slide of the genitalia should settle the question.

In this connection it might be well to note that Holland is incorrect in stating (Butt. Book, 198) that the male specimen figured by Gibson (1920, Rep. Can. Arct. Exp. Pt. I, Pl. II, fig. 3) should be referred to *norna* Thun. The genitalia of this same specimen, figured on Pl. I, fig. 2, distinctly show that Gibson was perfectly correct in treating it as a large form of *semidea*; the entire lack of ocelli on the primaries is a further proof of its relationship to *semidea*. To my mind it represents the opposite sex of the female specimen figured by Gibson (Pl. II, fig. 1) which Holland (Butt. Book, p. 200) refers to his so-called new species *gibsoni*, (the reference to fig. 7 is evidently a typographical error); if this be correct—a matter which I cannot check up on at present—then *gibsoni* Holl. will be better placed as a race of *melissa* Fabr., scarcely distinguishable, except by somewhat larger size, from *semidea* Say.

A further error is made by Holland in figuring under *subhyalina* Curt. (Butt. Book, Pl. LXIII, figs. 26, 27) a *semidea*-like form which may be *assimilis* Butl. (*arctica* Gibs.). The correct relationship of *subhyalina* was established by Elwes and Edwards in their revision after an examination of the type male and this reference was confirmed by Elwes in a later paper (Can. Ent., XXVI, 133) where he replies to some of W. H. Edwards' criticisms. It might have been profitable to Dr. Holland and have resulted in fewer misidentifications in his latest work if he had devoted some of the "reflection and careful study" he claims to have used in identifying *subhyalina*, to the above mentioned paper by Elwes.

Argynnis cybele subsp. *krautwurmi* Holl. This so-called race is based on four females from the Upper Peninsula of Michigan, the principal characteristic being the "pale buff" ground color of the wings as compared with the "bright fulvous" of typical specimens. Mention is also made of the paler basal area of the underside of forewing but this, as well as the amount of blackish suffusion in basal half of upperside, is variable; in a series of females from any one locality considerable variation in these respects is noticeable, depending partly on the age and condition of the specimen.

*Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

As regards the paler ground color I find that there is a distinct tendency in all our eastern Canadian *cybele* females, with the exception of those from southern Ontario, to show this to a greater or less degree. There are before me females from St. John, N. B.; Knowlton, Que.; Ottawa, Ont., and the Algonquin Park region which are noticeably paler than those from Bobcaygeon and Toronto, Ont., one Ottawa female being quite as pale as the specimen figured by Holland on Plate LVI, fig. 2, and agreeing also in other particulars.

In the male sex there appear to be no tangible differences. I believe therefore, that we are dealing merely with a color phase of the female sex and not with a distinct geographical race; it is not improbable that normally colored females will be found to occur in upper Michigan, when longer series are obtainable.

Argynnis electa Edw. In both the Annals of the Carnegie Museum, Vol. XX, 39, 1930, and the revised edition of the Butterfly Book, p. 91, Dr. Holland attempts to prove that the arbitrarily selected type of this species by myself (B. & McD. Contributions, III, 75) cannot hold and that his figure (Pl. X, fig. 8) is that of the true type. In spite of Dr. Holland's criticism the facts remain as stated.

1. Edwards' series under the name *electa* was undoubtedly mixed, and I was perfectly justified in restricting the name to the species represented by one of the original specimens which was further labelled "type"; this restriction will hold.
2. A large portion of Edwards' series, as far as I remember, consisted of Colorado specimens representing a species very close to if not identical with what has been recently described by Barnes and Benjamin as *A. atlantis* v. *beani,* (1926, Bull. S. Calif. Acad. Sci. 91). It was this form which was distributed by Edwards himself as *electa* as a specimen before me from the Geddes' Collection with label in Edwards' handwriting "Electa, Colo." shows; and for years the name was applied by lepidopterists in this sense.
3. Holland's figured specimen has no relation to either of the above-mentioned forms as the almost entire lack of black sex-scaling on the veins of the forewing distinctly proves; it belongs to the *aphrodite* group. It can hardly be said, as Holland claims, to agree best with Edwards' original description as Edwards states that the discal markings of the upper side of the forewings are "as in *atlantis* and allied species," and although not specifically mentioned it seems hardly likely that he would overlook the heavy black sex-scaling so obvious in *atlantis,* and also, I might add, in *electa* as restricted by myself.

Argynnis coronis Behr. Dr. Holland argues at length in the Annals of the Carnegie Museum, Vol. XX, p. 41, in favor of establishing the older idea of this species, with synonym *juba* Bdv., as indicated by Edwards in his Butterflies of North America, Vol. III, Arg. IV. He considers my identification of the species, with *liliana* Hy. Edw. as a synonym (B. & McD., Contributions, III, 80) as thoroughly disturbing to the established usage of fifty years, would regard W. H. Edwards as the author of the name *coronis,* and claims that the specimens figured by Edwards should be considered as the actual types.

Without going into very full details I might state my opinion that, even if Strecker's specimens cannot be held to be types, (which I am quite willing to

admit) Behr, according to the International Rules, will still be considered as the author of *coronis* and that therefore Edwards' action in marking specimens in his collection as types of this species was entirely *ultra vires*.

The whole matter of the identity of *coronis* hinges, however, on a statement by Behr in his original paper which has apparently been wrongly regarded by both Edwards and Holland as of such little value that they omit all reference to it. The statement is as follows: "This species frequents several localities near the Bay of San Francisco." Now if our Californian entomologists can show by actual collections that the *coronis* of Edwards and Holland, *i. e. juba* Bdv., a species from the Sierra Nevada foothills, occurs in the environs of San Francisco Bay, I am then willing to accept Holland's synonymy but not until then; to my mind this probability is extremely unlikely and biding such time I shall adhere to my stated opinion, W. H. Edwards, Dr. Holland and established usage notwithstanding.

Brenthis albequina Holl. After a very careful study of a paratype of this so-called species, donated to the Canadian National Collection by Dr. Holland, and the figures of the types given in the revised edition of the Butterfly Book (Pl. LV, figs. 19-21) I have come to the conclusion that there is nothing to distinguish *albequina* from our ordinary Canadian race of *myrina* to which the name *atrocostalis* Huard will apply (See Can. Ent., LX, 274). With the European *selene* D. & S. it has, of course, nothing to do, this latter species lacking completely the marginal silver marks on the underside of primaries. A good many of the differences mentioned by the author are undoubtedly due to the rubbed condition of his specimens and the stress he lays on the splitting of the second silver spot from the inner margin in the median band on underside of secondaries is unwarranted; in our series from the north shore of the Gulf of St. Lawrence, along with normally marked specimens some occur with spot as in *albequina*, and in others the inner half of the spot has been *entirely eliminated*. It might further be noted that the so-called varieties *terraenovae* Holl. (Pl. LV, fig. 13) and *jenningsae* Holl. (Pl. LVI, fig. 9) of *myrina* could also be readily reduced to the synonymy of *atrocostalis*. The former name is based on specimens with rather more black basal suffusion on upperside than normal; this, however, is not constant in Newfoundland specimens, judging by our small series from this country, and can furthermore be matched exactly in individual specimens from our Ottawa and Algonquin Park series. The name *jenntngsae* is based on an aberrant specimen with the median band of dark spots fused together and enlarged, a feature that occurs sporadically in specimens throughout the entire range of *myrina* in eastern Canada.

Heodes charlottensis Holl. I have before me two females from Metlakatla, B. C., a small settlement near Prince Rupert on the mainland opposite the Queen Charlotte Islands, which appear to agree with Holland's figures (Pl. LXIV, figs. 48, 49). I should suggest that *charlottensis* Holl. is merely a varietal form or geographical race of *mariposa* Reak.; it has essentially the same type of maculation and also the checkered fringes of this species.

Plebeius aquilo var. *suttoni* Holl. This variety, described and figured in the Butterfly Book (Pl. LXVIII, figs. 7-9) from Southampton Island material will probably have to sink to *franklini* Curtis, based on material from the same general

region but still further north. *Franklini* is at present listed as a synonym of *aquilo* but it seems likely that the form of the extreme north differs sufficiently from the topotypical Labrador race to warrant at least a varietal name. The only material before me at the present time consists of two males from Ellsmere Island; one of these fits in pretty well with Holland's short diagnosis, the other being extremely aberrant in the maculation of the underside.

Thanaos avinoffi Holl. After a comparison of a pair of paratypes of this so-called species from Yukon Territory with the series of specimens from the Albertan Rocky Mts. (Banff, Nordegg) in our collection which have gone under the name *persius,* I find that the Alberta specimens cannot be differentiated from the Yukon ones. The male genitalia are very similar to those of *persius* Scud. as figured in the Butterflies of Eastern United States and Canada but show slight differences which in conjunction with the rather unicolorous blackish coloration of the forewings would seem to warrant retaining the name *avinoffi* for the race of *persius* extending through the Canadian Rockies to Alaska. Unfortunately I have not sufficient definitely placed eastern material of *persius* to make any accurate comparisons: our eastern Canadian series of specimens seem all to belong to *lucilius* rather than to *persius,* although frequently listed under the latter name.

THE NYMPH OF GOMPHUS QUADRICOLOR WALSH (ODONATA)

BY E. M. WALKER,
Department of Biology, University of Toronto.

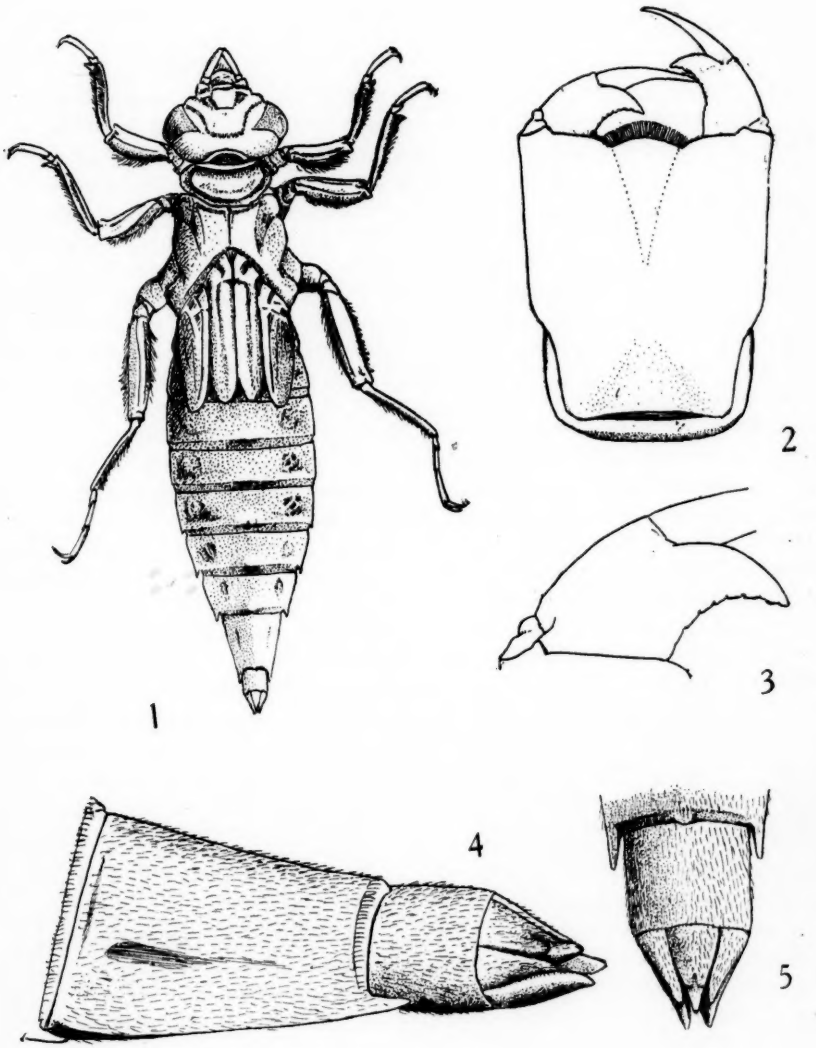
On May 29, 1926, the writer found several Gomphus nymphs on the muddy bottom of the Credit river at Erindale, Ont. It was on a quiet pond-like part of the river, where there are patches of cat-tails (*Typha latifolia* L.) and some other emergent plants, but only a few yards below a considerable stretch of shallow rapids.

One of the nymphs was full-grown and was brought back alive to the laboratory. Early in June the writer left Toronto for the West and placed the nymph in the care of Dr. Norma Ford. On June 7th an adult male Gomphus emerged and was killed on the 10th when the colours were mature. This specimen proved to be *G. quadricolor* Walsh, a rare species hitherto unknown from Canada, whose nymph is described below for the first time.

On June 15 and 16, 1927, I again visited the spot where the nymphs were taken and was not long in finding both adults and exuviae. The latter were difficult to discover as they were mostly hidden in the dense grass and herbage along the water's edge. No adults were seen where the exuviae occurred but a few were flushed in the grassy clearings on the upper slopes of the river valley, while others appeared in the river bottom but only in the vicinity of the rapids. Adult males were common along this part of the river also on June 20th and on this date the first female was captured in a clearing about a hundred feet farther up the slope. Another female was taken on July 2, 1928, and a few more exuviae on June 8, 1929.

I visited the same locality on June 16, 1932, but the only gomphines seen on this occasion were *G. villosipes, G. fraternus* and *Ophiogomphus rupinsulensis.* The first of these is not uncommon on the quiet parts of the stream, being fre-

CAN. ENT. VOL. LXIV PLATE 9



GOMPHUS QUADRICOLOR WALSH.

Fig. 1—Male nymph, last instar. 2.—Labium, ventral view. 3—Right labial palpus. 4—Abdominal segments 9 and 10 and anal pyramid of male nymph, dorso-lateral view of left side. 5—End of segment 9, segment 10 and anal pyramid of male nymph, dorsal view.

quently seen about the spot where *G. quadricolor* emerges.

Since the adults of *G. quadricolor,* on returning to the river after the teneral period is over, seek the vicinity of running water, it is believed that oviposition takes place here and the eggs or young nymphs drift downstream, exuviae having been found only on the quiet part of the river below the rapids. This is a common habit in certain species of *Gomphus* and *Ophiogomphus.*

Nymph (described from exuviae). Similar to *G. spicatus* and *G. exilis* but much smaller than the former and averaging a little smaller than the latter, hairy as in *spicatus.* General colour pale yellowish, obscurely marked with dusky on head and thorax; legs and wing-pads and three series of abdominal blotches (antero-median and lateral) dusky. Head not appreciably different in form from those of *spicatus* and *exilis,* concave behind, the postero-lateral corners rotundo-angulate, eyes not at all prominent, third joint of antennae about 1.5 times as long as the first two joints together, scarcely enlarging distal, broadly fringed on both sides with long hairs, fourth joint a minute rudiment. Labium small, the hinge barely or not quite reaching the posterior surfaces of the procoxae; mentum one-sixth longer than its distal breadth, constricted in the proximal two-fifths, beyond which the lateral margins are straight and parallel. Median lobe a little less than one-third as wide as the entire distal margin, broadly arcuate, the median length being more than half the length of the hairs of the marginal fringe. Labial palpi curved as in *exilis, spicatus,* etc., the inner margin strongly concave with about seven very low and rounded crenulations representing the usual teeth. Inner wing-cases reaching the base of abd. seg. 4, the outer wing-cases a little longer. Abdomen very similar in outline to that of *G. spicatus,* a little narrower and more tapering than in *G. exilis,* often appearing considerably narrower as the exuviae are frequently left in a compressed form; broadest at seg. 4, barely narrower on 5, tapering evenly to the apex of 9, although seg. 9 may appear slightly constricted in compressed exuviae. Tergal surface transversely convex at base, becoming increasingly tectate from segs. 7 to 9, though without any semblance of a median ridge, segs. 6 to 9 each with a very low median prominence at the posterior tergal margin, which in 9 projects as a very minute tooth, smaller than in *exilis.* Measured mid-dorsally seg. 9 is about one-third longer than 8, its length being about equal to the basal width in the uncompressed condition; apical width about half the basal width. Lateral spines on segs. 6 to 9, those on 9 reaching nearly to the middle of 10; seg. 10 about two-fifths the length of 9 (not including the intersegmental membrane), parallel-sided. Anal pyramid about as long as 10; epiproct (median appendage) a little shorter than the paraprocts (inferior apps.) and a little longer than the cerci, less tapering than in *spicatus* and *exilis,* its basal width three-fifths of its length; the developing inferior appendage of the adult male is a little more than two-thirds the length of the epiproct.

Length of body (mm.) 25.0 - 26.5; abdomen 17.0 - 17.5; hind wing 4.5; hind femur 4.5 - 5.0; width of abdomen 5.5 - 6.0.

The nymph of *G. quadricolor* resembles that of *G. spicatus* somewhat closely though considerably smaller (length of *spicatus* 30.0 - 30.5 mm.). The abdomen of *spicatus* is slightly more tapering, due mainly to the greater length of seg. 10, which is half as long as 9. The dorsal surface is practically without median prominence, seg. 9 lacks the median tooth and the lateral spines extend

only to about the proximal fourth of seg. 10. The mentum of the labium is a trifle larger and the teeth of the labial palpi are distinct and angular. The tibial burrowing hooks are a little smaller.

The nymph of *G. exilis* is similar in size to that of *quadricolor,* although some individuals are considerably larger. The abdomen is less tapering, its greatest width is between segs. 5 and 6; seg. 9 is relatively shorter (one-fourth longer than 8) and broader, its basal width being nearly 1.5 times its length. The distance from the middle line to the lateral margin, measured along the base of the segment, is about equal to the mid-dorsal length, while in *quadricolor* it is only about three-fourths of the mid-dorsal length of the segment. The mid-dorsal region of seg. 9 is somewhat more ridged in *exilis,* and terminates in a more distinct tooth, while the dorsal prominences are likewise better developed and occur on segments 5 to 9. The median lobe of the labium is less produced, its length being less than half that of the marginal fringe of hairs. The teeth of the labial palpi are angular and much better developed than in *quadricolor.*

THREE NEW AMERICAN MAYFLIES (EPHEMEROP.)

BY JAMES G. NEEDHAM,
Cornell University, Ithaca, N. Y.

Two of my colleagues, in years long gone by, have brought back to me from their journeyings specimens of interesting undescribed mayflies that I have placed in the Cornell University collection to await for study a more convenient season. Three of these I now describe. The first two are rather unique species of two well-known genera. They were collected by Dr. J. C. Bradley on trips southward and westward in the United States. The third was collected by Dr. J. T. Lloyd in the high Andes of Columbia. It represents a new genus and species. Its diurnal habits and swift flight are unusual among mayflies.

Isonychia velma n. sp.

Length of male about 14, plus tails 28, fore wings in the male 16mm.; in the female 17mm.

This is a handsome, large, reddish-plumbeous species with bicolored legs and freckled wings. Head in the male above covered by the large mouse-colored hemispherical ascalaphoid eyes, reddish brown before and behind the black-ringed ocelli, the flagellum, antennae and the nasal carina a little darker. In the female the eyes are more brownish in color, smaller, and remote, being separated by a space as wide as their own diameter. On the top of the head there is a broad parallel-sided, reddish, crown-stripe that ends posteriorly in a thin, transparent, projecting, occipital crest. The middle ocellus is half as large as the paired ones in both sexes.

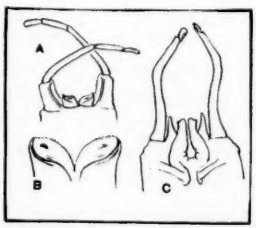
Thorax reddish brown with narrow whitish edgings on many of the sclerites and with more uniform tint of brown on the convex portions of the dorsum. Front legs rufous, darkest on the tibia; middle and hind legs bicolored; reddish on coxae, outer half of femora and tarsi with intervening portions pale, translucent, yellowish. Wings bicolored. There is a roseate tint along the costal strip covering veins C, Sc and R1 and intervening membrane in the fore wing; and there is a little touch of the same color at the extreme anal angle of both wings. The veins are brown, paler at the extreme

base and along the costa of the hind wing, and the cross-veins along both sides of vein R are bordered with brown to form diffuse spots. The membrane is hyaline behind the costal strip except for a faint wash of brown around the outer border of the hind wings, that is best developed in the male.

Abdomen reddish plumbeous with obscure pale middorsal and midlateral stripes subtended by brighter plumbeous, forming interrupted lines. These darken and become confluent on segment 9. The large, thin, flat lobes on the side of segment 9, and the apical ventral pair at its apex, are translucent. The latter project beyond the apex of the 10th segment and are decurved at their widely separated tips. The tails in the male are reddish on half a dozen basal segments and thereafter, transparent whitish, less white in the female. The rudiment of a middle tail is five-jointed. Forceps and penes of the male, brownish, of the form shown in the figure.

The freckled wings of this species will at once distinguish it from others of the genus.

One male (the type) and two females from Putah Creek near Maticello, California, December, 1917; five females from Russian River, California (no date), and several addition females from Cloverdale, California, October 4, 1917; all collected by Dr. J. C. Bradley.



A. Male genitalia of *Isonychia velma* n. sp.; B. Penes of same species greatly enlarged; C. Male genitalia of *Alloydia cacautana* n. sp.

Leptophlebia bradleyi n. sp.

Length 8, tails 11, foreleg of ♂ 10, fore wing 9 mm.

This mid-winter species is brown varied with paler. Legs yellowish brown, with black rings on the apical third of all femora. Wings yellowish hyaline with brown veins; costal cross-veins numerous and distinct, those of the stigmatic region crowded and irregular and so anastomosing as to form two rows of cells in the costal space, the outer row having half the width of the inner one. The greyish color of the semi-opaque stigmatic area overspreads subcostal and radial inter-spaces.

Abdomen brown, darker toward the ends, with a narrow, mid-dorsal, longitudinal, pale line on segments 1-8, and on either side of this line, with two longitudinal rows of pale triangular segmentally arranged spots, confluent on the base line of each segment; the ventral side of the abdomen is paler, somewhat yellowish, but the ganglia are not marked.

Genitalia pale brownish; basal segments of forceps slowly tapering and sinuately curved, the two small terminal segments dilated internally and sub-

triangular (in one specimen there are three terminal segments). Penes long, tapering, separated for three-fourths their length by a V-shaped cleft; reflexed spur curved, spatulate, acute at tip, reaching to the level of the bottom of the cleft.

Three males of this species were taken flying over Billy's Lake, in the Okeefinokee Swamp, Georgia, on December 21, 1913, and others were taken swarming over the "run" between Billy's Lake and Cowhouse Island in the same swamp, 27th to 29th of December, 1914, by Dr. J. C. Bradley.

Easy recognition characters for this species are the black rings on the femora and the pattern of pale linear markings on the abdomen.

Alloydia n. gen.

Tails two, exclusively long in the male, short in the female. Fore legs shorter and more rudimentary than middle and hind legs; all, crooked and distorted, especially their tarsi. Face personate, with a pair of very broad transparent flaps descending from the frontal carina to end below in broadly rounded free margins. Eyes small, smooth, in the sexes subequal. Wings with costal and radical veins approximated at the front border, closing the subcostal furrow, and with strong cross-veins in several series joining the long veins of the wing disc. Hind wings with dilated humeral angle, but without cross-veins. Male forceps two-jointed.

This genus belongs to the Oligoneuria series, is like Oligoneuria in leg characters. In the disposition of the principal veins of the wing disc it resembles the diminutive neotropical Lachlania, but it differs markedly from all the genera of this series in cross-vein arrangement.

Type, the following species:

Alloydia cacautana n. sp.

Length ♂ 13, ♀ 15, plus ♂ tails 38-40, ♀ 13, front wing 17, hind wing 8mm.

Colors blackish brown and amber yellow. Head blackish above, including the antennae, with a wide M-shaped yellowish bar across the front before the eyes, the outer legs of the M short. Disc of prothorax blackish, paler across front and extreme rear margins. Mesothorax blackish with a pair of transverse pale marks on the front border, an obscure pale middorsal line, and parallel therewith two sharply marked lateral lines that are conjoined to rearward by a narrow distinct, pale W-mark on the most convex portion of the dorsum. A diffuse pale line encircles the mesothorax in the rear, and the metathorax is wholly paler. Venter of thorax infuscated on the more convex areas of the sterna, paler on the sutures and about the bases of the legs.

Wings obscure hyaline, with veins heavily infuscated, especially at the front. Costal border strongly arched. Costa and radius closely approximated or even appressed, closing the subcostal furrow. The broad triangular area of the wing lying between veins R1 and Cu1 is traversed lengthwise by three long veins and crosswise by rather strong cross-veins in several transverse series. The foremost of these three long veins appears as a branch of R1, being closely applied thereto from the base outward and separating therefrom just beyond midway its length. On either side of this apparent branch are five cross-veins. In the next succeeding interspace are four cross-veins and the next one is

divided by an angulated intercalary vein with three cross-veins before it and two behind. These longitudinal veins are perhaps compound veins (their homologies are not clear) since they all widen out broadly at the base and appear double there. Vein Cu1 appears forked near its basal third and is strongly recurved in its apical fourth. There are no cross-veins in the cubital area, and there are none in the hind wing. The latter is hopelessly crumpled in the specimens before me.

Abdomen yellowish, infuscated on the lateral margins and across the apices of the segments, lightly in the male, heavily in the female. Tails white in the male (as are also the forceps), blackish in the female. Forceps with a long, weak and sinuous basal joint, and a very short terminal one. Penes separated in their basal half then convergent and parallel, tapering to a rounded apex which bears a little lateral external tooth. The triangular lobes of the subgenital plate (9th sternite) are prolonged rearward in a pair of slender sharp points that surpass the level of the tips of the penes. The extremely long tails of the male are composed of segments of variable length. They are much wider than long at the base, but quickly lengthen and become several times longer than wide, and at the slender tips they become again a little shortened.

Many specimens of both adults and nymphs were collected by Dr. J. T. Lloyd in the Valle de Papas, Upper Cacauta River in the high Andes of Colombia, March 24, 1912. Most of the imagos and all of the nymphs were taken for study to Mt. Holyoke College, where they were burned in the fire that destroyed the zoology building. A vial of duplicate imagos that was retained in the Cornell University collection has furnished the material for this description. There are fifteen male and three female specimens, none in very good condition.

Doctor Lloyd has written me concerning his field observations on this species as follows:

"They were of greater interest to me than any other insects I saw in South America. I can still picture them with their gray-blue bodies and curious wings, flying up and down the upper Cacauta with a rapidity that would rival the swiftest dragonflies. They flew about an inch above the water and followed perfectly the undulations of the swift riffles. They successfully dodged my net until I learned to strike down stream with the bottom of the rim of the net under water.

"They flew up and down stream *in copulo*, after the manner of dragonflies. I caught several mating pairs. They oviposited (I'm quite certain this is what they were doing) by dipping the tip of the abdomen in the swift water during flight. I spent much time during two weeks in the Valle de Papas watching them. They were abundant there."

NEW RHOPALOCERA (LEPIDOPTERA).

BY J. D. GUNDER,

Pasadena, California.

Anthocharis sara Bdv., race **inghami** new race

An Arizona race nearest to *reakirtii* Edw. in which the under side design of the secondaries is uniformly dense, dark olive green and the cell bar on the upper side primaries is noticeably thick, rectangular, clear cut and conspicuously black, forming on the reverse side of the wing clear-cut, dart-shaped spots. The

secondaries of the females are generally yellowed on upper sides and rarely are all wing surfaces entirely yellow or white. Both sexes average in size *reakirtii* as found in Los Angeles County, Calif.

Holotype—♂, expanse 37mm.; Tucson, Ariz., March 9, 1929.

Allotype—♀, 38mm.; same locality, March 18, 1928.

Paratypes—6♂ and 1♀, March 20th. to April 2nd., 1932. Globe, Ariz., and vicinity, these collected by D. K. Duncan, Globe, Ariz.

Types in Author's coll., including a long series from the Globe region. Named after Mr. Chas. Ingham of Los Angeles who first netted examples while working on the life history of *Anth. pima* Edw. near Tucson.

Note.—I have several examples of *thoosa* Scud. from southern Utah (near type locality); a few from Dividend, Utah (Spalding, just before his death); and many from Lehman Cave Resort on Mt. Wheeler, White Pine County, Nevada (Mr. Frank Morand, 5/19-23/29). *Thoosa* Scud. is really a distinct and unique *Anthocharis* and by all means should be raised out of its present synonymy.

Anthocharis sara inghami Gun., tr. f. **duncani** new tr. f.

Apical red spot a yellowish buff on both upper and under surfaces. Similar to *sara sternitzkyi* Gun. in color change. Classification: Change of Color—red to yellow; chromatism.

Holotype—♂, expanse 35mm.; Globe, Ariz., March 21, 1932.

Type in Author's coll. Named after Mr. D. K. Duncan, Globe, Ariz., a reliable field collector.

Anthocharis sara Bdv., race **alaskensis** new race.

The Alaska representative of the *sara-reakirtii* group, both sexes being slightly smaller in size than Los Angeles County, Calif. *reakirtii* Edw. Easily differentiated by the much extended black flares in basal area which protrude on primaries as well as secondaries almost twice as far as in *reakirtii*. The females are generally white, but always have yellow color, a distinct yellow flushing, external of the orange spot on primaries, which in *reakirtii* is white. This yellow in addition to the regular orange in the apical area, is a distinguishing feature of the females. The under sides of both sexes are heavily green mottled, more so than in *reakirtii*.

Holotype—♂, expanse 35 mm.; Skagway, Alaska, May 29, 1925.

Allotype—♀, expanse 36 mm.; same, June 2, 1925.

Types in Author's coll., including a topotypical series of 22♂ and 6♂, same place and dates, all constant and similar. These specimens were taken by a Rev. Shoemaker whose present address is unknown.

Eurymus eurytheme Bdv., tr. f. **rudkini** new tr. f.

Having black fusing extending outwardly from the black cell spots joining with the black marginal design on the primaries after the fashion of *philodice miscidice* Scud. On the under side of the secondaries there is an accumulation of red streaks in the center of the wing extending mostly outwardly and around the silvered spot as in the case of *miscidice*. Classification: Change of pattern; melanifusism, a primary development. The type is a white female. I have examined and have upper and under side photographs of tr. f. *fumosa* Stkr. at Chicago. It comes under chromatism in change of color, as does tr. f. *virida* Stkr.

Holotype—♀, expanse 46mm.; San Marino, Los Angeles Co., Calif., May 23, 1931.

Type in Author's coll. Named after our fellow entomological worker, Mr. E. B. Rudkin of San Marino.

Eurymus nastes moina Stkr., tr. f. **harperi** new tr. f.

Upper side of primaries darkly clouded over as in *streckeri obscurata* Verity; distinct black fusing extending outward from upper side primary cell spots like in *philodice miscidice* Scud. Upper side of secondaries and under sides typical. Classification: Change of Pattern; melanifusism, fairly developed.

Holotype—♀, 42mm.; Ft. Churchill, Manitoba, Can., July 19, 1932.

Type in Author's coll. Named after Mr. Vernon Harper of McCreary, Man., who this year secured long series of *moina* Stkr. in both sexes. Albinism seems indistinguishable in the females.

Erebia mackinleyensis new species.

Nearest to *magdalena* Stkr. of which it may prove to be a race because of similar size, wing shape and general blackness of color. *Male*: entirely jet black all over like *magdalena* except for a red area or rather two reddish patches on upper side primaries between median nervules 1 and 3; on the under side these red patches become a general reddish flush, pronounced and extended similar to that found on the upper side primaries of *discoidalis* Kirby; the secondaries are all black with no red color. *Female*: the color tone of blackness is not as deep as that of the males, but lighter than that of female *magdalena;* on the upper side primaries the entire disk is red flushed, this flushing of color being repeated broadly on the under sides as well; the secondaries are entirely black on both surfaces as in the male. This flushing of red in both sexes varies in different specimens but is always present especially in the females. Colorado examples of *magdalena* show no red design.

Holotype—♂, expanse 47mm.; Sable Pass, McKinley National Park, Alaska, June 16, 1932.

Allotype—♀, expanse 46mm.; same location, June 21, 1932.

Paratypes—5 ♂ and 3 ♀, same locality and similar dates; one pair deposited in U. S. National Museum (Barnes Coll.), Washington, D. C., and one pair deposited in Canadian National Collection at Ottawa, Canada.

Types in Author's coll. Specimens all collected by Mr. Frank Morand of Los Angeles who has spent several seasons at higher elevations in Alaska.

Prior to an intended revision of American *Argynnis*, it is thought best at this time to describe a number of new groups in the genera. The author will be glad at any time to loan series from his collection to responsible parties, there being some 2,000 mounted examples to draw from. Photographic reproductions of many types are also available. While many of the following new names merely represent races, it has been the entomological custom to describe as species in the first instance until their relationship is established. This method has been found satisfactory where a comparative description is undertaken.

Argynnis aphrodite Fabr., race **winni** new race.

The small Canadian race of *aphrodite* Fabr. in eastern Canada which extends westward to probably Lake Superior where it joins or more likely becomes *cypris* Edw. averages about *atlantis* Edw. in size. The yellowish band

on under side secondaries is encroached upon by the brown shade as in *aphrodite alcestis* Edw. In the females there is a tendency for the submarginal row of ground color spots on upper side primaries to become whitish, or nearly white as they graduate into the apical area, this tendency is also noticed in Canadian *cypris* more so than in Colorado examples. Where the veins terminate the fringes are black, otherwise they are white; whereas in *aphrodite*, they are brown or tan shade instead of white. This is the race which has often been referred to as *columbia* Hy. Edw.

Holotype—♂, expanse 52mm.; St. Calixte de Kilkenny, Que. (about 40 miles from Montreal), July 13, 1931.

Allotype—♀, expanse 53 mm.; Shawbridge, Que., Aug. 4, 1930.

Paratypes—3 ♂ and 3 ♀, similar localities and dates, one pair deposited in Canadian National Collection, Ottawa, Can., and one pair deposited in U. S. National Museum (Barnes Coll.), Washington, D. C.

Types in Author's coll. including a series of topotypicals. Specimens received through the courtesy of Prof. A. F. Winn of the Peter Redpath Museum, McGill University, Montreal, and named in his honor.

Argynnis aphrodite cypris Edw., tr. f. **mayae** new tr. f.

Having the black spotting of the upper sides elongated inwardly with a concentration of black shaded design around the cell area especially. On the under sides the silver spots are elongated inwardly on the primaries, while on the secondaries there is a general field of heavy, elongated silver spotting concentrated and stretching forth from the basal area. The female, in this case, has very dark upper side primaries with only cell spots showing, together with a trace of submarginal brownish spotting, while its secondaries are also somewhat dark mottled as to design. On the under side of the female the primaries show a confusion of black and brown design and the secondaries have the same basal area silver flared spotting. Classification: Change of pattern; melanifusism, a medium development in the male and near final degree of change in the female.

Holotype—♂, expanse 57mm.; Sand Ridge, Bener Dam Lake, near Kelwood, Man., Can., Sept. 10, 1931.

Allotype—♀, expanse 62mm.; same location, Aug. 17, 1930.

Types in Author's coll. and taken by Mrs. J. F. (Marjorie) May of Kelwood, Manitoba, after whom they are named.

Argynnis whitehousei new species.

This species is probably a Canadian Rocky Mountain branch of the well known *aphrodite* Fabr., differing superficially by having scarcely any dark shading through the basal areas on the upper sides and by having wings narrowed and less rounded and also by having a definite yellow band on under side secondaries which is never encroached upon as in *aphrodite alcestis* Edw. The females have less heavy maculation on their upper sides and their veins are less black defined. The ground color upon the upper sides of *whitehousei* is practically the same in both sexes, being a very rich reddish brown, whereas in *cypris* Edw. the females take on a duller cast; also the under side secondary maculation of *whitehousei* is clear-cut, the yellow band not compressed or narrowed as is often the case in *cypris* from Colorado. A series of *columbia* Hy. Edw. from Lac la Hache on the Cariboo Trail, Cariboo District, B. C., which is undoubtedly the type locality,

as the American Museum ♂ type is marked "La Hache," is smaller in size, veins not outlined in black at all and the specimens have upper side basal area dark shading. The females of *columbia* are of the *atlantis-beani* B. & Benj. type which is significant, having their upper side outer margins heavily black banded and the whole of the ground color a yellowish brown cast like female *beani* and not reddish as in *whitehousei*. In other words it is possible that *columbia* does not belong in the *aphrodite* group.

Holotype—♂, expanse 62mm.; *allotype*—♀, expanse 65mm.; Jaffray, B. C., Aug. 5, 1929.

Paratypes—2♂ and 2♀, same locality and dates, one pair deposited in the Canadian National Collection at Ottawa, Ont., and one pair placed in the U. S. National Museum (Barnes Coll.), Washington, D. C.

Types in Author's coll., including a fine lot of topotypes and others from Cranbrook, B. C., which is nearby. Named after Mr. A. C. Whitehouse of Vancouver, B. C., who is in the Forest Service and stationed mostly in the Jaffray region.

Argynnis atlantis beani B. & Benj., tr. f. **hutchinsi** new tr. f.

Upper side of primaries entirely black shaded with none of original design showing except the yellow of the two cell spots and a faint indication of a row of yellow spots through the limbal area; secondaries with the inner three-quarters of wing dark and outer area having diffused rows of original spotting. Under sides: primaries very dark around cell region and through discal area, but shading out to brownish through limbal area; secondaries having a concentration of silver spotting in basal area, dark brown through discal area and submarginal row of silver spotting faintly indicated. Classification: Change of Pattern; melanifusism, almost a final degree of change.

Holotype—♂, expanse 51 mm.; Twp. 2N. Range 1W., Jefferson County, Mont., July 21, 1929.

Type in Author's coll. Specimen taken by Prof. R. E. Hutchins of State College, Miss.

Note. Beani B. & Benj. not only occurs at Banff, Alta., its type locality, but also through mountainous British Columbia (Smithers, Coast District), Idaho, Montana and northwestern Wyoming, the author having series from these various regions.

Argynnis macdunnoughi new species.

In size and superficial appearance near to *oweni* Edw. from the Mt. Shasta, Calif. but on the upper sides obviously related to the *chitone* Edw. group, though dwarfed in size in comparison. *Oweni* has an almost uniform dark ground color above, while *macdunnoughi* has a lighter aspect through the limbal areas. Also in *macdunnoughi* the yellow band on under side secondaries is more pronounced or definite. *Macdunnoughi* also is of a drab greyish appearance in some specimens on the under side. (One paratype in Canadian coll. is unsilvered, due probably to the conditions causing chrysalis burn, a bleaching or whitening malfiguration which shows through on the surfaces of both wings). *Cottlei* Comst. is a synonym of *irene* Bdv. Dr. Comstock agrees in this regard as he had no series for comparison at the time name was offered or when his book was printed.

Holotype—♂, expanse 49mm.; *allotype*—♀, expanse 51mm.; Elkhorn Ranch Resort, Gallatin County, Mont., Aug. 1, 1928.

Types collected by Dr. McDunnough and in the Canadian National Coll. at Ottawa, as well as 2♂ paratypes of same date and location. 2♂ and 1♀ paratypes in Author's Coll., together with a series of males and females taken by Mr. Hutchins, Mr. Wind and Dr. Albright of Great Falls, Montana, in the same general region, including the Teton Range south in Wyoming. This is the species mentioned by Dr. McDunnough on page 107 of the May, 1929, *Canadian Entomologist* and I am pleased to name it after him.

Note. For the convenience of future students who may wish to know the definite type locality of *macdunnoughi*, I quote from a letter received from Dr. McDunnough, "If you go up what they call (at the Resort) Spring Creek for about half a mile, the path branches to the right about where the water ceases to flow and rises sharply over a ridge, ending in an open meadow. If you cross this meadow to the top of the slope, you will find *Argynnis* plentiful in the open woods to the right. Slightly earlier than my date might be a better collecting time."

Argynnis rhodope Edw., tr. f. **gregsoni** new tr. f.

Very black with very little brown ground color showing through on upper sides, except traces through limbal area. Submarginal lunate spots on upper side very nearly black immersed. Under side of primaries shows elongation of the black spots below the cell. Classification: Change of Pattern; melanifusism, upper surfaces well developed.

Holotype—♀, expanse 58mm.; Mt. Washington (6000 ft.), Forbidden Plateau, V.I., B.C., Can. July 7, 1931.

Type in Author's coll. Collected by and named after Mr. J. D. Gregson, Courtenay, V. I., B. C., a young Canadian entomologist of whom I know we will hear in the future.

Note.—I have examined the type of *sordida* Wright in the Calif. Acad. of Sciences at San Francisco and have excellent upper and under side photographs of it. The specimen is merely a rubbed male *bremnerii* Edw. and therefore a synonym.

Argynnis albrighti new species.

Nearest to *platina* Skin. from Utah and Idaho. The black designs of the upper sides are extra heavy and the light spots, marking the position of the under side silver spotting, is very lightened in contrast, like those on upper side *gallatini* McD. In *platina* the green cast or shadow design is very delicate, an olive shade, while in *albrighti* this green is dark, heavier and the brown in conjunction is more pronounced. In female *albrighti* this greenish cast of design is even more developed. Specimens average size of *platina* from Idaho; smaller than Utah type locality examples.

Holotype—♂, expanse 52 mm.; Highwood Mts., Chouteau County, Montana, June 24, 1931.

Allotype—♀, expanse 54mm., same data.

Paratype—1♂, Monarch, Cascade County, (just south of the Highwood region), dated July 26, 1931.

Types in Author's coll. and all taken by Dr. C. C. Albright, Great Falls, Mont., after whom they are named.

Argynnis garretti new species.

Nearest to *utahensis* Skin., but larger, though probably its northern representative; also in general appearance to *halcyone* Edw. Less bright with a less golden ground color than *utahensis*, but having the outer marginal black edging on upper side secondaries in the females which is characteristic of Colorado *halcyone*. Upper side basal area shading as in *halcyone*. The general black spotting of upper sides is thick and heavy, heavier than in *halcyone*, also the ground color is yellowish compared to reddish in former species.

Holotype— ♂, expanse 62mm.; Cranbrook, B. C., Can., July 29, 1929.

Allotype— ♀, expanse 63mm.; same locality, July 27, 1929.

Paratypes—2 ♂ and 2 ♀; one pair deposited in Canadian National Coll. at Ottawa, Can., and one pair placed in the U. S. National Museum (Barnes Coll.), Washington, D. C. A series of topotypical examples in both sexes in Author's coll., including the types.

Named after Mr. C. Garrett of Cranbrook, B. C., whose collection of diurnals was recently purchased by this Author.

Note. In a letter from Dr. McDunnough he sinks *picta* McD. to *bremnerii* Edw. which is probably correct as a paratype ♂ is in this Author's coll. and the two seem indistinguishable.

Argynnis eurynome washingtonia B. & McD., form **ranierensis** new form.

Without trace of silvering beneath in both sexes; typical *washingtonia* being well silvered. The greenish cast shows up more extensively without silvering. British Columbia race *opis* Edw., which is unsilvered, has a distinct rusty-reddish color beneath on secondaries. *Erinna* Edw. from Oregon has delicate upper side black maculation, and evenly designed characters beneath. *Bishoffii* Edw. has dark upper sides, heavy marked under sides; (I have *bishoffii* from the Forbidden Plateau of Vancouver Island, B. C., which is a new record for B. C.). *Eurynome clio* Edw. is simply the unsilvered form in both sexes of *eurynome* Edw., described by Edwards himself as a 'variety' which in his mind meant a form, not a race. *Eurynome clio* is a form at type locality and at every locality known to this Author where the unsilvered specimens occur with *eurynome*.

Holotype— ♂, expanse 45mm.; Paradise Valley, Mount Ranier, Pierce Co., Washington, Aug. 12, 1931.

Allotype— ♀, expanse 45mm.; same locality, Aug. 10, 1931.

Paratypes—3 ♂ and 3 ♀, Aug. 8 to 12, 1931, same place. One pair deposited in U. S. National Museum (Barnes Coll.), Washington, D. C., and one pair placed in Canadian National Coll. at Ottawa, Ont., Can. Types in Author's coll.

Argynnis eurynome artonis Edw., form **rubyensis** new form.

Well silvered beneath in both sexes; typical race *artonis* Edw. being entirely unsilvered. The contrast of the silvering upon a ground of pure golden yellow is very striking. Some specimens show the merest trace of a delicate olive green lunated around portions of the silvering.

Holotype— ♂, expanse 49mm.; Franklin Slough, near Wright's Ranch, Ruby Valley, Elko Co., Nevada., July 9, 1929.

Allotype— ♀, expanse 56mm.; same place, July 12, 1929.

Paratypes—6 ♂, same locality and dates. 1 ♂ deposited in U. S. National Coll. (Barnes Coll.), Washington, D. C., and 1 ♂ deposited in Canadian National Coll., Ottawa, Can. Types in Author's coll. Specimens collected by Mr. James Cottle of San Francisco and named after Ruby Valley.

Note. Artonis Edw. is in no respect a synonym of *eurynome* Edw. though it is a race thereof. See article by Mr. James Cottle of San Francisco in the *Pan-Pacific Entomologist,* No. 1, July, 1931, regarding *artonis, gunderi,* etc. Ruby Valley is evidently the metropolis of this race of *eurynome* Edw., the type locality being Elko, Nevada, for a designated Edwards type. Elko is just a few miles north of Ruby Valley.

Euphydryas anicia D. & H., race **windi** new race.

An orange color, a reddish-orange beneath like *carmentis* B. & Benj., being lighter in this respect than *eurytion* Mead and much lighter than type locality *anicia* D. & H. In darkness the upper side designs approach *bernedetta* Leuss., but with the red spots confined to definite position and not showing red fusing of this color into white maculation of the discal areas as is found in *anicia* and *eurytion;* in other words there is less fluxion of design. The primary wings of *windi* also tend to be narrowed and more pointed. A race of *anicia* also by *genitalic* comparison. *Maria* Skin. has a bright looking upper side, more after the *wheeleri* Hy. Edw. group.

Holotype—♂, expanse 36mm.; *Allotype*—♀, expanse 39mm.; Timber Island, Teton Mountains, Teton County, Wyoming, June 29, 1931.

Paratypes—4 ♂, same place and similar dates of which one is placed in the U. S. National Museum (Barnes Coll.), Washington, D. C., and one in the Canadian National Coll., Ottawa, Can. Types in Author's coll. including a series of 15 ♂ and 15 ♀ from local points known as Blacktail Butte, Moose, etc. and dated June 21st. to July 7th.

Euphy. editha hutchinsi McD. also occurs in the same region, but of slightly earlier flight; these two *Euphydryas* are superficially alike, but may be told apart when mounted. Race *windi* Gun. should be catalogued just above *eurytion* Mead in the *Euphydryas* check list of plate 16, in the July, 1929, *Pan-Pacific Entomologist.*

Melitaea neumoegeni Skin., tr. f. **fridayi** new tr. f.

The ground color is creamish or light buff instead of the usual reddish-brown. Similar in color change to *gabbii pasadensis* Gun. as illustrated in Comstock's "Butterflies of Calif." Classification: Change of color; chromatism, red to yellowish. Fresh specimen not faded.

Holotype—♀, expanse 43mm.; Little Rock, Los Angeles Co., Calif., April 3, 1932. Type in Author's collection.

Named after Mr. F. W. Friday of Los Angeles, our desert lepidoptera specialist.

Phyciodes batesii Reak, tr. f. **harperi** new tr. f.

Upper side: primaries; an outer marginal black band, followed by an area of yellow-brown which is free of design through discal area, to basal area which has an unchanged design like typical *batesii.* This wing surface appears almost like that of *Melitaea acastus pearlae* Gun. illustrated in color on pl. 1, fig. 7, Jan., 1926, *Entom. News.* Secondaries: outer three-quarters of wing dark, almost jet black to basal area which has a single black spot surrounded by yellow-brown

ground color. *Under sides*: both wing surfaces having a delicate obscure mottling of light brown and yellow with designs blurred and no black maculation. Classification: albifusism (?), as in *Phyc. campestris macdunnoughi* Gun.

Holotype—♀, expanse 34mm.; McCreary, Manitoba, Canada., Aug. 1st, 1931.

Type in Author's coll. Named after Mr. Vernon Harper of McCreary, Man.

Basilarchia lorquini Bdv., form **fridayi** new form.

Representing the connecting link between *lorquini* Bdv. and *nevadae* B. & Benj. Hybridical in appearance, combining the characters of each. Apical area brown as in *lorquini*. Has the submarginal row of white spots on upper sides through the black limbal area as in some *nevadae* or in most *weidemeyrii* Edw.; this row starting conspicuously through the brown of the apical area and the size of the spots decreasing as they progress all through the secondaries. *Lorquini* has no such row of spotting which is the distinguishing feature of *fridayi*. Under side designs much lightened in color compared to *lorquini*, the brown giving way to greyish outline, which in lightness approaches *nevadae;* the whiteness being more noticeable through limbal areas.

Holotype—♀, expanse 62mm.; Leevining Creek, near Mono Lake, Mono County, Calif., July 22, 1930. Type in Author's coll. Named after Mr. F. W. Friday of Los Angeles.

Note.—There are several examples in both sexes in local collections I have examined. This form has been overlooked because of the commonness of *lorquini* elsewhere. *Nevadae* and *lorquini* meet in this Calif. area.

A NEW DICHELONYX FROM CALIFORNIA (SCARABIDAE, COLEOP.)

BY LAWRENCE W. SAYLOR,
Berkeley, California.

Dichelonyx vandykei n. sp.

Male. Medium-sized, moderately robust; head, thorax, base of clypeus, club of antennae and underside usually black or brownish-black, otherwise brownish. Upper surface sparsely clothed with yellow hairs; underside densely covered with white scale-like hairs. Head densely, variolately punctate, often with a small irregular smooth space on the vertex; clypeal suture moderately impressed; clypeus prominent, usually moderately reflexed, truncate at apex, the angles rather narrowly rounded, the sides faintly rounded or sub-parallel, closely coarsely punctate. Antennal club not quite equal to funicle, the club darker than the remaining segments. Thorax without distinct median groove, not twice as broad as long, surface very closely punctate at sides, the punctures more distinctly separated at the middle; basal marginal line fairly distinct; sides obtusely angulate just before the middle, very feebly sinuate posteriorly, a little more so anteriorly, the hind angles very obtuse, and broadly rounded. Elytra not twice as long as broad, and not quite three times as long as the prothorax, surface rather coarse and rugose, the punctures sparse and of medium size, sides not parallel and slightly rounded. Hind tibial spurs unequal, narrow, pointed, the inner about twice as long as the other.

Female. More robust, club of antennae much shorter than the funicle, prothorax and head rufo-testaceous; hind angles of prothorax a little more distinct than in the male; hind tibial spurs slightly wider than in male, with one spur about three-fourths as long as the other; yellow hair of upper surface rather long, especially on thorax.

Length—8. to 8.5 mm. Width—3.5 to 4. mm.

Described from a series taken in Yosemite Valley, Cal., on the Golden Leaf or Mountain Live Oak (*Quercus chrysolepis*) in June by Dr. E. C. Van Dyke, after whom I take pleasure in naming it.

For the present time, I am associating with this species a series taken by Mr. E. P. Van Duzee from Butte Creek Canyon, near Chico, Cal., on April 23, 1922, and also a small series from Big Bend Mountain, Butte County, Cal., taken by Mr. H. H. Keifer from *Quercus kelloggii.* This series differs from the species described herein especially in that the color of the male is different, parts of the legs and elytra being rufo-testaceous, the rest piceous; the females, however, are similar. The color is constant throughout the series.

Dichelonyx vandykei has been confused heretofore with *D. oregona* Van Dyke, from which it differs especially in the denser prothoracic puncturation and by the absence of the prominent hind prothoracic angles found in the latter.

The author took three females, presumably of this *D. vandykei,* from Willow on the American River, El Dorado County, near Whitehall, Cal., on June 21, 1931.

A revision of the genus is now in preparation, and will be published by the writer some time in the future.

Holotype, male, and *Allotype,* female, also several *paratypes* will be deposited in the collection of the Academy of Sciences in San Francisco; designated paratypes remain in the author's collection, and also a paratype each in the collections of Mr. Howard Hinton, and Mr. E. Gorton Linsley.

A NEW CANADIAN ANDRENA (HYMENOPTERA, APOIDEA)

BY T. D. A. COCKERELL,
Boulder, Colorado.

Recently having occasion to study a group of metallic-colored *Andrena,* I took up a couple of paratypes of *A. sladeni* Viereck in my collection, and discovered that they belonged to quite different species. From Viereck's original description, I could not definitely make out which was the genuine *A. sladeni,* nor, indeed, whether that name really belonged to either of them. I accordingly asked Dr. McDunnough to investigate, and he turned the matter over to Mr. G. Stuart Walley, who carefully examined the holotype and the available paratypes. The outcome may be presented in the form of a table, based on females:

Stigma clear but dull ferruginous; nervures in region of cells pale; second cubital cell receives recurrent nervure about middle; no evident erect white hairs on first tergite; mesothorax dull; clypeus polished, with strong punctures 1

Stigma dark reddish to practically black; nervures in region of cells dark.. 2

1. Larger, length fully 10mm.; stigma darker, less orange; basal nervure meeting nervulus; facial foveae much broader, extending at least half way from orbit to antenna, narrowly separated from orbit, the lower end contracted to an angle placed next to orbit; process of labrum broadly triangular;

clypeus with a rather distinct median ridge; abdomen greenish, depressions of tergites 2 to 4 strongly marked; area of metathorax with a somewhat shining border (Penticton, B. C., April 30, 1919, E. R. Buckell)..... .....*sladeni* Viereck

Smaller, length about 9mm.; stigma lighter, dull orange-ferruginous; basal nervure falling short of nervulus; facial foveae very narrow, not nearly extending half way from orbit to antenna, separated from orbit by a rather broad shining band, the lower end of the fovea rounded, not at all angular or approaching orbit; process of labrum very short and broad; clypeus with no distinct median ridge; abdomen dark bluish, little shining; depressions of tergites broader (at least on second) and poorly defined except at sides; area of metathorax with no trace of a shining border (Fairview, B. C., May 18, 1919, E. R. Buckell).....*walleyi* n. sp.

2. Mesothorax dull, hardly shining; first tergite posteriorly with long conspicuous white hairs..... 3

Mesothorax conspicuously shining 4

3. Clypeus dull; hair of thorax above yellowish (Olympia, Wash.)..... .....*nigrocaerulea* Ckll.

Clypeus polished; hair of thorax above clear white (hills back of Oakland, California) .....*epileuca* Ckll.

4. Wings reddish; second cubital cell receives first recurrent nervure in middle (Meadow Valley, California) .....*lustrans* Ckll.

Wings greyish; second cubital cell receives recurrent nervure before middle (Blackfoot, Idaho, June 22, 1931, and June 12, 1932, Louise Ireland) .....*lustrans* Ckll., var. a

(The California and Idaho *A. lustrans* are in general so much alike that I cannot regard them as different species.)

Mr. Walley reports as follows on the holotype of *A. sladeni,* from Invermere, B. C., May 19, 1915 (F. W. L. Sladen):

"Length 10 mm., or a little more; stigma dull orange ferruginous; basal nervure meeting nervulus; facial foveae broad, extending very slightly more than half way from orbit to antenna, broadest above, gradually contracted downward and terminating at a blunt angle directed toward orbit; space between fovea and orbit narrow; process of labrum broadly triangular; clypeus without a median ridge, but the punctures fewest along the median line; abdomen greenish, though not strongly so; depression of tergites 2 to 4 more evident than in a Fairview specimen; area of metathorax with a somewhat shining border."

One paratype from Invermere has the stigma darker, with less orange. A paratype from Penticton in the Canadian Collection agrees very closely with the holotype. The above description, compared with my Penticton specimen, applies very well. The clypeal ridge which I referred to is feeble. There is no doubt that the Penticton bee is the genuine *A. sladeni,* and the Fairview bee (of which there are two specimens in the Canadian Collection, with the same data as mine) is new. I take pleasure in calling it *A. walleyi.* The holotype will be placed in the Canadian National Collection.

Andrena extensa Viereck falls in the vicinity of *A. sladeni* in my table, but has much white hair on apical part of first tergite; mesothorax entirely dull; clypeus polished; basal nervure practically meeting nervulus; facial foveae narrow, but narrowly separated from orbit, rounded at lower end; abdomen greenish, depressions of tergites not sharply marked; area of metathorax with a shining border; hair of thorax above pale reddish. This is obviously quite distinct. My specimen is from Okanagan Lake, B. C.

Andrena complexa Viereck agrees with *A. walleyi* in having narrow facial foveae, but it has abundant light hair on mesopleura (this hair black in *A. walleyi*) and abdomen greener; also, it has dark nervures and dark margin of stigma. The *A. sladeni* group, as tabulated above, consists of blue or green species of medium size (9-11 mm.), with white or slightly yellowish hair on thorax above; black hair on face, cheeks, pleura and legs, and caudal tuft black; no light bands on abdomen; facial foveae black.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO, 1932.

The Sixty-Ninth Annual Meeting of the Entomological Society of Ontario was held at Ottawa on December 1st and 2nd, 1932.

The morning and afternoon sessions, held in the Confederation Building, were largely devoted to the presentation of papers and their discussion.

The Thursday evening meeting was held in the auditorium of the National Museum. Dr. W. H. Brittain, President of the Society, acted as Chairman and Dr. R. Matheson, Cornell University, gave an interesting lecture on "Insects in Relation to Animal and Human Diseases." Dr. Barton, Deputy Minister of Agriculture, expressed to Dr. Matheson the appreciation of the audience.

During the Smoker, which was held on Friday evening in Standish Hall, Hull, Dr. Jenness of the Victoria Museum gave an interesting talk, illustrated by motion pictures, on "Episodes in the Arctic." Mr. R. H. Painter of the Entomological Branch contributed some interesting anecdotes from the grasshopper campaign in Manitoba.

The meetings were well attended by members from the various Provinces and a number of visitors.

During the course of the meetings the following papers were presented:—

"Presidential Address"—Dr. W. H. Brittain, Macdonald College, Quebec.

"Notes on the Control of the Pear Psylla and San Jose Scale"—W. A. Ross, T. Armstrong and D. F. Patterson, Entomological Laboratory, Vineland Station, Ontario.

"Studies on the Effects of Burying and of Cultivation on Oriental Peach Moth Larvae"—T. Armstrong, Entomological Laboratory, Vineland Station, Ontario.

"Observations on the Relation of Temperature and Moisture to the Oriental Peach Moth"—G. G. Dustan, Fruit Branch, Toronto, and T. Armstrong, Entomological Laboratory, Vineland Station, Ontario.

"Some New Facts Concerning the Gladiolus Thrips (Taeniothrips gladioli M. and S.)"—Alan G. Dustan and W. G. Matthewman, Entomological Branch, Ottawa.

"Blackfly Control with Larvicides"—C. R. Twinn, Entomological Branch, Ottawa.

"Some Notes on the Biology and Life History of Psocids"—L. R. Finlayson, Dominion Parasite Laboratory, Belleville, Ontario.

"Sodium Fluoride as a Control for Cattle Lice"—R. W. Thompson, Ontario Agricultural College, Guelph, Ontario.

"The Present Status of Knowledge Concerning the Classification of the Elateridae"—W. J. Brown, Entomological Branch, Ottawa. (By title.)

"The Japanese Beetle Question"—L. S. McLaine, Entomological Branch, Ottawa. (By title.)

"The Grasshopper Situation in the West and Forecasting Outbreaks"—Norman Criddle, Entomological Laboratory, Treesbank, Manitoba.

"The Present Status of the Pale Western Cutworm in the Prairie Provinces"—H. G. Crawford, Entomological Branch, Ottawa.

"Notes on Surface Treatments as a Promising Factor in White Grub Control"—G. H. Hammond, Entomological Laboratory, Hemmingford, Quebec.

"On the Function of Air Sacs in Insects"—G. J. Spencer University of British Columbia, Vancouver, British Columbia. (By title.)

"Insects Infesting Grain in Farmers' Granaries in Southwestern Ontario"—G. M. Stirrett and D. A. Arnott, Entomological Laboratory, Chatham, Ontario.

"Some Remarks on Fumigants"—C. R. Twinn, Entomological Branch, Ottawa.

"Recent Developments in the Corn Borer Parasite Situation"—G. Wishart and I. E. Thomas, Dominion Parasite Laboratory, Belleville, Ontario.

"The European Corn Borer Situation in Ontario in 1932"—L. Caesar, Ontario Agricultural College, Guelph, Ontario.

"Practical Results of Biological Control as Applied to Insects"—A. B. Baird, Dominion Parasite Laboratory, Belleville, Ontario.

"A Successful Parasite Introduction Into British Columbia"—R. Glendenning, Entomological Branch, Agassiz, British Columbia.

"Design for a New Type of Light Trap to Operate at Controlled Intervals"—H. L. Seamans and H. E. Gray, Entomological Laboratory, Lethbridge, Alberta.

"The External Parasites of Two Birds Introduced Into British Columbia"—G. J. Spencer, University of British Columbia, Vancouver British Columbia. (By title.)

"A Co-operative Quantitative Investigation of the Relation Between Summerfallow Methods and the Wireworms in Saskatchewan; a Progress Report"—K. M. King and R. Glen, Entomological Laboratory, Saskatoon, Saskatchewan.

"The Grasshopper Campaign in Manitoba in 1932"—A. V. Mitchener, Manitoba Agricultual College, Winnipeg, Manitoba. (By title.)

"Possibilities of Co-operation Between the Entomologist and Economist"—Dr. J. F. Booth, Economics Branch, Department of Agriculture, Ottawa.

"The Present Status of the European Pine Shoot Moth in Southern Ontario"—R. W. Sheppard, Plant Inspection Office, Niagara Falls, Ontario.

"The European Pine Shoot Moth"—J. J. de Gryse, Entomological Branch, Ottawa.

"Control of the Locust Borer by Forest Management"—A. H. MacAndrews, New York State College of Forestry, Syracuse University, Syracuse, N. Y.

"Forest Insects of the Season in the Maritimes and Gaspe Peninsula"—R. E. Balch and L. J. Simpson, Entomological Laboratory, Fredericton, New Brunswick.

"Notes on Some of the More Injurious Insects of the Season 1932 in Canada." (By title.)

Nova Scotia	Mr. F. C. Gilliatt
New Brunswick	Mr. R. P. Gorham
Quebec	Mr. G. Maheux and Mr. C. E. Petch
Ontario	Prof. L. Caesar and Mr. W. A. Ross
Manitoba	Prof. A. V. Mitchener and Mr. N. Criddle
Saskatchewan	Mr. K. M. King
Northern Alberta	Prof. E. H. Strickland
Southern Alberta	Mr. H. L. Seamans
British Columbia	Mr. E. R. Buckell

Mailed Saturday, Dec. 31st, 1932